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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,364	07/17/2006	Makoto Ishida	278285US0PCT	5533

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OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

QUINTO, KEVIN V

ART UNIT	PAPER NUMBER
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2826

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/12/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/12/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/549,364	Applicant(s) ISHIDA ET AL.	
	Examiner Kevin Quinto	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6 and 7 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 9/14/05 & 4/24/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (USPN 6,828,160 B2) in view of Evans, Jr. et al. (USPN 5,440,173) and further in view of Sakashita et al. (United States Patent Application Publication No. US 2005/0040516 A1).
4. In reference to claim 1, Liu (USPN 6,828,160 B2) discloses a similar structure. Figures 9(a)-15 of Liu illustrate a semiconductor memory element characterized by an Al_2O_3 film (401) on a semiconductor single crystal substrate (301) having a FET structure. There is a Pt thin film (402) disposed on the Al_2O_3 film (401), a ferroelectric thin film (403) disposed on the Pt thin film (402), and an upper electrode (404) is disposed on the ferroelectric thin film (403) and having a memory feature. Liu discloses the use of a Pt thin film and a ferroelectric thin film, but does not disclose the use of a

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single crystal Pt thin film and a highly oriented ferroelectric thin film. However the use of such films is well known in the art. Evans, Jr. et al. (USPN 5,440,173, hereinafter referred to as the "Evans" reference) discloses a ferroelectric device which uses an electrode formed of a single crystal Pt film in order to attain a low fatigue highly oriented ferroelectric film and therefore longer lasting ferroelectric device (column 3, lines 22-25 and column 5, lines 8-16). In view of Evans, it would therefore be obvious to use a single crystal Pt thin film and a highly oriented ferroelectric film. Liu does not disclose the use of an epitaxially grown gamma Al_2O_3 film. However the use of this film is well known in the art. Sakashita et al. (United States Patent Application Publication No. US 2005/0040516 A1, hereinafter referred to as the "Sakashita" reference) discloses the use of an epitaxially grown gamma Al_2O_3 film in a ferroelectric structure in order to provide a barrier between the substrate and the electrode film so as prevent a reaction between them as well as to provide the base for orienting the electrode film (p. 4, paragraph 47 and p. 5, paragraph 54). In view of Sakashita, it would therefore be obvious to use an epitaxially grown gamma Al_2O_3 film. The examiner notes the limitation regarding the use of an epitaxial process to form the Pt thin film. However this places the claim into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

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Claim 1 is not patentably distinguishable from the Liu, Evans, and Sakashita references regardless of the process used to form the Pt thin film, because only the final product is relevant, and not the process of making such as epitaxial growth.

5. With regard to claim 3, Liu discloses that the substrate is silicon (column 4, lines 42-47). It is understood that it is single crystal.

6. In reference to claim 5, Liu discloses (column 5, lines 10-14) that the ferroelectric thin film may be BaMgF₄, BaTiO₃, and PLZT (Pb_yLa_{1-y}Zr_xTi_{1-x}O₃).

7. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu (USPN 6,828,160 B2) in view of Evans, Jr. et al. (USPN 5,440,173) and further in view of Sakashita et al. (United States Patent Application Publication No. US 2005/0040516 A1) as applied to claim 3 above and further in view of Hasegawa (USPN 4,933,298).

8. In reference to claim 4, Liu discloses the use of a single crystal Si substrate but does not disclose that the surface is (100) face. However the use of the (100) face in a semiconductor device is well known in the art. Hasegawa discloses that it is well known in the art that the mobility of carriers is dependent on the crystal plane (column 1, lines 19-21). Hasegawa also has a table which shows that electron mobility is greater in the (100) face compared to the (110) face while hole mobility is greater in the (110) face compared to the (100) face (column 1; between lines 30 and 35). Furthermore Hasegawa discloses that it is well known in the art to form n-channel MOSFETs in a (100) face and p-channel MOSFETS in a (110) face since it leads to devices with a faster operating speed (column 1, lines 46-49, abstract). In view of Hasegawa, it would

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therefore be obvious to form the n-channel device (column 6, lines 39-46) of Liu on a (100) face of the Si single crystal substrate in order to attain a faster device.

9. In reference to claim 5, Liu discloses (column 5, lines 10-14) that the ferroelectric thin film may be BaMgF₄, BaTiO₃, and PLZT (Pb_yLa_{1-y}Zr_xTi_{1-x}O₃).

Allowable Subject Matter

10. Claims 6 and 7 are allowed.

11. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests or renders obvious an ultrasonic sensor made of an epitaxially grown gamma Al₂O₃ film on a semiconductor single crystal substrate with an epitaxially grown Pt thin film formed on it with successive layers of a highly oriented ferroelectric thin film and an upper electrode formed on it which is treated in order to adjust a resonant frequency.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVQ


LEONARDO ANDUJAR
PRIMARY EXAMINER